The First Ten Million Reals Are the Hardest

by
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Trademarks

- Linux is a trademark of Linus Torvalds in several countries
- Unix is a trademark of X/Open in several countries

Who Am I....
....and Why Should You Listen?

- Thirty-six+ years in the computer industry
  - Mainframes 5 years
  - Unix 22 years
  - Linux since 1994
- Programmer, Systems Engineer, Product Manager, QA, Technical Marketing, Educator, Consultant
- Large systems to very small ones
- Vendor *and* a customer

In The Beginning

- Hardware was expensive, computers were few
  - Software was hand-tailored
  - Not “computer science, but computer black magic”
  - “Punched cards and FORTRAN is all you need”
- 1980s – Hardware was becoming less expensive
  - Software was manufactured
- 2005+ Hardware is incredibly cheap
  - Software should be tailored again

1000 Business People In A Room...

- How many have had a bug in proprietary software? How much did that cost?
  - Lost time
  - Lost effort
- How many have had to change the way they did business? How much did that cost?
  - Retraining
  - Loss of sales
  - Customer dissatisfaction

Software Freedom allows Business Decisions

Why Does Manufactured Software Break Down?

Commodity software for proprietary solution

- 1980's
  - 100 engineers
  - 1000 customers
  - 1 bug fix, one request for new functionality
- 2005+
  - 150 engineers
  - 4.5 million customers

See the problem?

If Each Computer System Lost 5 Dollars/Day....

We loose 2.5 BILLION dollars per day....
....how much do *you* lose?

....with the proper software, how much could you *make*?

Most People Do Not Want Products

- Cars and Food
- Making software do what people want
- People want service

Service

- Highly trained and skilled service
  - Like a brain surgeon
  - Like a lawyer
- Not just packaged product installers

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Function of a University

- ***Not*** to provide you with a job
- To create thinking electorate
- To create thinking workforce
- To teach you how to learn from media
- ***Not*** to teach you how to use some company's products

Systems Administration

- Junior Systems Administrator
  - Create new accounts
  - Install new systems
  - Help answer questions
  - Monitor logs of various systems
- Senior Systems Administrator
  - Plan new system layout
  - Evaluate hardware and software (and patches)
  - Monitor and apply security patch issues
  - Helps create policy for running system

System Administrator - Skills Needed

- Knowledge of hardware and how it works
  - Disk layout
  - Memory requirements
- People skills (!BOFH)
  - Industrial Psychology
- Knowledge of software inter-relationships
- Knowledge of high and low-level languages

Network Administrator

- Designs network
  - Routers
  - Bridges
  - Subnets
- Protocols supported
  - Evaluates new protocols

Other Administrators

- Database (DBA)
  - Data dictionary
- Web
- Security

Open Certification...
....Linux Professional Institute

- Certifies Linux Systems Administrators
- Worldwide
- Distribution Neutral
- Vendor Neutral
- Does not compete in training area
- Non-profit
- Advisory board

Programmers

- Jr. Programmer
  - Maintains existing programs
  - Analyzes existing programs for performance flaws
- Senior Programmer
  - Writes new and modifies old programs
  - Designs simple changes to over-all system

Supercomputers

- 1995 – Thomas Sterling and Donald Becker
- Supercomputers made of COTS – (PCs)
  - High speed networking
  - Parallelization of code
- Extreme GNU/Linux

Supercomputers at 1/40th of the price.....

....and you can get applications!

Supercomputers

- Up to 10,240 processors
  - 60% of top 500 supercomputers run GNU/Linux
- Standard GNU/Linux interfaces
- Specialized libraries
  - PVM, MPI, OpenMP
- Solving lots of problems

What Types of Problems?

- *Image rendering*
- Image recognition
- Weather forecasting
- Global warming
- Modeling and meteors
- Resource prospecting through seismic imaging
- Data Mining
- Genome research (MySQL)
- Searching document image databases
- Molecular dynamics simulations
- Virtual Reality
- Calculating Financial Reserves (12 hrs to 15 min)

Embedded Systems: The Problem

Lots of small vendors, each with own OS

- Self-written device drivers
- Self-written network stacks
- Self-ported to different architectures
- Different programming interfaces
- Often single tasking

Expensive!

Helsinki – June 1997

- Kiosks
- Linux Ideal for Embedded
  - Secure
  - Stable
  - Multi-tasking
  - Multi-architecture
  - Royalty-free
- How many kiosks will you need?

How many will your customers need?

Lend Each Student One....

- x486 processor
- 2 Mbytes Flash
- 8 Mbytes RAM
- ETHERNET
- Serial Lines
- Parallel Lines
- LCD controller
- Breadboard development system

Quality Control Engineer (perhaps the most powerful)

- Junior QA Engineer
  - Runs regression tests against code
  - Hand tests new code looking for weaknesses
- Senior QA Engineer
  - Writes regression tests
    - Studies code (working with programmer) to get complete coverage of regression tests
    - Determines pass or fail rate
  - Manages field test requirements

Bad quality control can make or break a company

Quality Control Engineering Training

- QA Engineering
  - Probability and Statistics
    - "It would only happen one in one billion times"
  - Coverage Analysis
- Servicability Engineering
  - How to make the product easier to service
  - Hardware and Software

Systems Analyst

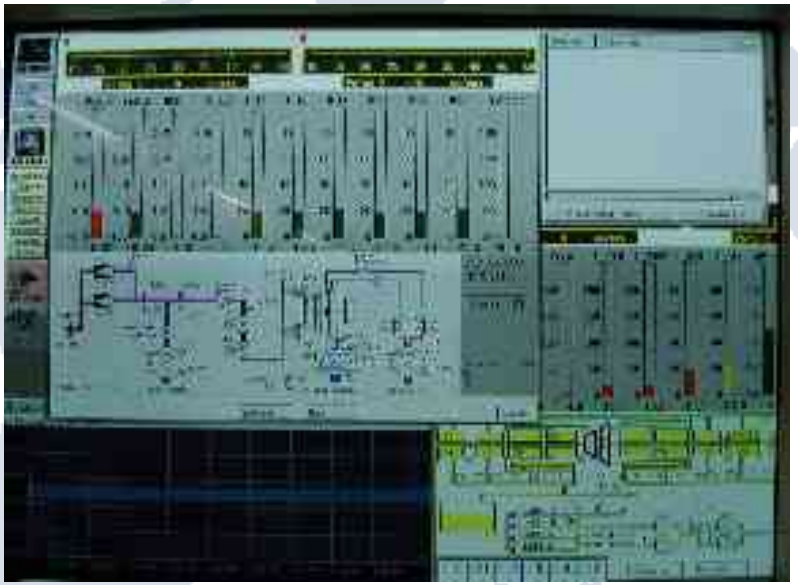
- Analyzes Data and steps to convert to information
- Designs programs to be written by programmers
  - May write “difficult” parts themselves

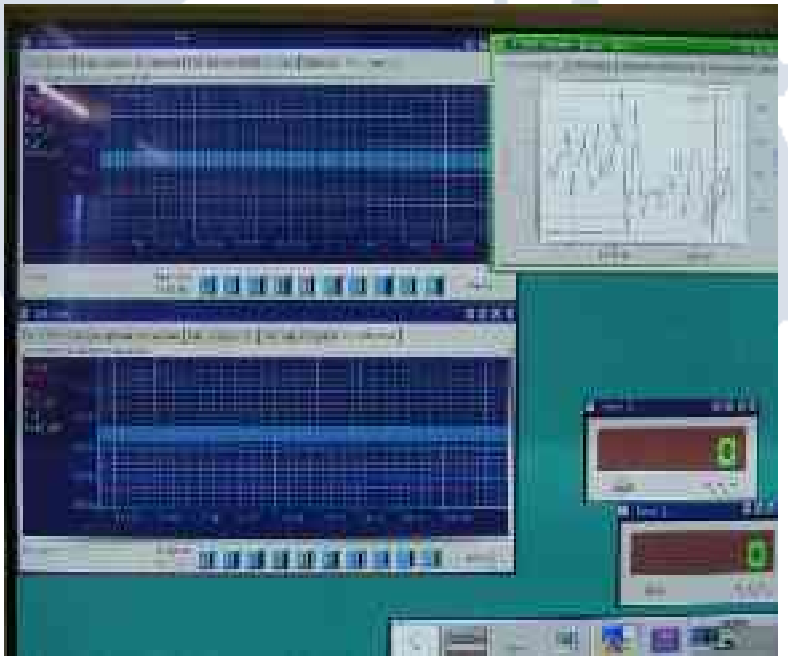
St. Petersburg

- Turbine Test Bed
- Proprietary Software
  - Expensive
  - Inflexible
  - English

Enter Linux

- Software uses
  - MySQL
  - GNUplot
  - Tcl/Tk
  - Python
- Less Costly
- More Flexible





Product Manager

- Determine needs for a product or service
  - What are customer needs?
  - What would customer be willing to pay?
  - How many customers would you have?
  - Are there special governmental requirements?
  - What training or support should be available?
  - When should (or do) you release the product?
- Works with Engineering, QA, Educational Services, Finance, Marketing

Product Management Training

- Some programming helps
- Some QA helps
- Marketing
- Finance
- Time/Workflow Management

Technical Marketing

- Inbound
  - Talks to customers and gathers their input for new products and services, presents to product management
  - Determines market segments for company to attack.
- Outbound
  - Develops and delivers marketing campaign to promote products already created
  - Explains complicated concepts in easy to understand jargon, relates to customer's business

Technical Marketing Skills Needed

- Have background, to be able to explain technical concepts to customers
- People skills (even more than BOFH)

Technical Sales/ Presales support

- Much like technical marketing, but more direct with customer
- First technical line of contact for customer

Post Sales Support

- "Man in a van"
  - Used more in past
  - Today, modular and mail-in
  - "Dial-a-geek"
- Telephone support
  - First line - "Is your system turned on, mouse plugged in?"
  - Second line - "Oh, you can spell Linux?"
  - Third line - "I have the source code, and can read it"
  - Engineering

Value-Added Reseller (VAR)

- Buys components from “Original Equipment Manufacturer (OEM)”
- Buys software from System OEMs or Independent Software Vendors (ISVs)
- Creates Solution for customer***S***
  - Normally not targeted to one particular customer

Consultant

- Evaluates individual customer needs and recommends a solution
- May provide solution, or just recommend VARs and other mechanisms for completion
- Writes high-level proposals
- “Take the money and run”

The Greying of Venezuela

- Trained IT students graduate from college in Venezuela
- Trained IT students do not have enough good-paying entry-level jobs to employ them
- Trained IT students leave Venezuela for Spain and Great Britain
- Remaining IT people get older.....

Local jobs mean a *local* future...

Educators

- University
  - Public or Private
  - Large or small
- Professional trade schools
- Grade Schools

Entrepreneurs

- Need technical and managerial skills
- Skills in fund raising, human management skills

Open Hardware

- Solarpc - www.solarpc.com
- Simputer - www.simputer.org
- Telephony - www.zapatatelephony.org

How Do Universities Change?

- Do not teach “product oriented courses”
- Teach collaborative programming
- Teach low-level assembly and machine level concepts
- Teach “how” and not just “what”
- Use Free and Open Source Software (FOSS) whenever possible
- Get other disciplines to think “free”

The Future

- Enterprise Creator – 22
- President - 21
- Kernel Developer – 16
- Distribution Developer - 14
- Systems Admin – 13
- Programmer – 12
- Systems Analyst – 11

Questions?